

# TEACHING-INNOVATION EXPERIENCE IN COMPETITIVENESS AND INNOVATION IN BUSINESS

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## Abstract

The aim of this paper is to contrast the students' opinions about the teaching-innovation experience carried out in the subject "Competitividad en Innovación en la Empresa" (Competitiveness and Innovation in Business). The procedure will start with the subject's profile, going through the main objectives and teaching methodology, to finish with evaluation and assessment, as suggested in the subject's syllabus for the academic year 2007/08. Taking this as a starting point and, due to the fact that the number of students in the control group is not very high, we suggest changing both the teaching methodology and the evaluation. These changes will be contrasted with the students' acceptance and involvement.

## Keywords:

ECTS, evaluation criteria, logbook.

## 1. INTRODUCTION: COMPETITIVENESS PROGRAMMES AND THE EDUCATIONAL GUIDES

In the Industrial Organization Syllabuses the subject 'Industrial Analysis and Competitiveness' appeared until the academic year 2002/03. This subject was a continuation of 'Strategies and Policies in Business' (I and II).

'Strategy I' was used to introduce the necessary concepts that would make possible to define the most important strategic variables for a company. It also explained and revised the instruments which apply the concepts mentioned before.

Particularly, 'Strategy I' was divided in two sections, the first one deals with the Fundamentals of strategic management and the second one with sector analysis and competitiveness. The programme contained the following units: Unit 0- Introduction: a wide perspective to strategy; Unit 1- The Concept of strategy; Unit 2- A framework for the analysis of strategy; Unit 3- Analysis of the sectorial environment; Unit 4- Sector internal analysis: segmentation, strategic groups and assessment of the competitors; Unit 5- Organization: the concept of organizational forms; and to conclude, Unit 6- Analysis of resources and capacities.

On the other side, 'Strategy II' deals with strategic decision-making and more specifically to the following units: Unit 1: Vertical integration; Unit 2: Strategy in global sectors; Unit 3: Diversification; Unit 4: Management on diversified Corporation.

With respect to 'Industrial Analysis and Competitiveness', it is focussed in the Analysis of the Competitive Advantage, consisting of the following Units: Unit 6-Characteristics and sources of the Competitive Advantage; Unit 7- Advantage in Costs; Unit 8- Advantage in differentiation; Unit 9- Competitive Advantage and sector evolution; Unit 10- Innovation management and Competitive Advantage in intensive sectors in Technologies; Unit 11- Competitive advantage in mature sectors.

In conclusion, with the subjects of the first and second course a wide revision of the concepts, techniques and applications linked to the strategic management of a company were done.

From the academic year 2002/03 a new syllabus is introduced, involving modifications in the programmes. The subject 'Industrial and Competitiveness Analysis' disappears and the new subject 'Competitiveness and Innovation in Business' appears.

As the subjects 'Strategy and Management in Business' (I and II) do not disappear, their programmes are changed to make them suitable for the new situation. The programme of 'Strategy I' remained almost the same, while the programme of 'Strategy II' was modified in order to include a section dealing with the Competitive Advantages which were part of 'Industrial Analysis' before.

From the first moment the new subject 'Competitiveness and Innovation' was orientated to complete those related to Strategy, approximating their contents to the innovation processes. Besides, the aim was to teach using the ECTS system (to a greater or lesser extent), although it was not in the programmes linked to this method assessment, at that moment.

In addition, it is pretended to follow the guidelines conveyed by the lecturers teaching that subject at the Engineering Schools in Andalusia. In order to achieve it, the subject scheme is taken as it is stated in the document 'Pilot Experience of European Credits. Universities of Andalusia. Common Educational Guide on Engineering on Industrial Organization' [1].

In the said guide it is stated that the orientation given to the subject must get students to reach 'a perspective of business management leading to the consolidation of the competitive side of the enterprise, by means of the sources of flexibility, innovation and the application of improvement tools'. In the same way, with the development of the syllabus, the aim is for students to reach and be able to apply in an adequate manner, a satisfactory level of knowledge in relation to the role played by innovation in the improvement of the organizations competitiveness, through the analysis of the competitive core, techniques for the invention and design of new products and facilities, the life of products and technology, the innovation of processes and the technology transfer. In addition, another objective is to make students aware of the importance in business management of an approach leading to flexibility, products and processes innovation, and predisposition to changes' [1].

It is recommended as a catalogue of educational techniques, the participative magisterial lecture, the supervised handouts, the analysis of examples plus individual and collective tutorials within the classroom. Besides it is recommended to use the catalogue of the following supervised academic activities: research and analysis of specialized information, elaboration of handouts referred to innovation management techniques and their later lecture; plus reading and comments on specific articles related to the analysed topic. [2, 3]

Finally the guide also includes recommended thematic modules and a basic bibliography. All the books gathered in the proposed bibliography were a direct contribution of the lecturers of Cadiz and obviously they have been followed here. The modules are the following:

- Module 1: The enterprise competitiveness. Types of competitive advantages. Competitive advantage and sector evolution.
- Module 2: Technological innovation and life span of the technology.
- Module 3: Models of Innovation Management.
- Module 4: Innovation Management in the company: instruments and techniques.
- Module 5: Competitiveness and innovation in the Spanish company.

The programme of the subject, as it is taught at the moment in the ESI (School of Engineering) of Cadiz, includes in a greater or lesser extent the previous modules, although module 5 is not explained in a theoretical way but using examples. In particular the program of Cadiz includes the following subjects:

#### Part I

Unit 1: Innovation, economy and business management.

Unit 2: Innovation strategy.

Unit 3: Technology: basic concepts.

Unit 4: Strategic implications of the factor technology.

Unit 5: Strategic management of technology.

Part II

Creative businesses and innovation.

## 2. PROPOSALS FOR THE EVALUATION

The programme of 'Competitiveness and Innovation' has also followed the Common Educational Guide, as for the methodology and evaluation [1]. It is reflected this way in the programme of the subject, which gathers the following proposals for methodology and assessment [1, 4]:

Methodology:

- Collaborative magisterial lecture.
- Supervised outlines.
- Analysis of cases.
- Individual and collective tutorials in the classroom.

Evaluation:

- 30 % activities proposed in the classroom (handouts and presentations, debate of cases, etc.).
- 70 % compulsory final examination. A minimum mark of 4 is required to add this mark to the one obtained in the previous point.

Nevertheless, due to the experience in previous courses in relation to students' participation and the large number of them coming regularly to the lectures, a different alternative of assessment was offered to students from this course in their first lecture. However, methodology was not to change significantly except for a more demanding participation in 'daily work' [5].

The proposal consisted of changing the assessment criteria by altering the percentages, that is, 70% would be for the proposed activities and 30% for the examination. In this way, the examination acquired a voluntary character. In order to be able to benefit from this alternative it was necessary for students to attend lectures regularly (this was an easily controllable variable since 14 to 16 students used to attend lectures).

Additionally a logbook was needed to sum up daily work [6, 7]. This summary had to reflect both the theoretical contents and the analysed cases previously studied in the classroom. The logbook should also be a record of all the activities demanded (common, individual and team activities).

The activities fulfilled and finally marked were (70%):

- Two individual activities of innovation. As an example the first one is described. It consisted of enumerating 5 product innovations, 5 innovations of services and 5 innovations of processes, explaining why they were considered as innovations. When classifying the innovations they had to state if they were radical or incremental and their origin (market or technology).
- Six papers including short papers from 4-5 to 25-30 pages. In relation to these papers there were two types of duties: to make a summary, and/ or questions of comprehension and relation to the studied topics.
  - Exposition of a theme based on the concept of Organization, and presentation of a related organizational chart.
  - Summary of all the theoretical units.
  - Group exposition of complementary bibliography on innovation. In this case, the groups of 2, 3 or 4 students had to read a book on innovation suggested by the lecturer. They also had to summarize it and make an exposition to the rest of the class with the aid of a presentation in PowerPoint or similar.
- Extra activities: for example, looking for innovative experiences in different sectors, summarizing them and making comments. Besides, some activities of this type were made within the classroom using the connections to Internet, videos of Youtube, etc.

### 3. CONTRAST WITH REALITY

Thinking of improving the described experience, final course students were asked to participate by answering the following questionnaire:

1st) Why do you study the degree on Engineer on Industrial Organization? Mark one or some of the options below ...

- a) Personal interest.
- b) Professional Interest (it is/ will be demanded by the company).
- c) Both.
- d) Others (to specify).....

2nd) From the two assessment options of this subject, traditional (examination + work) and alternative (logbook + work + participation), which one do you think contributes to a better learning?

- a) Traditional.
- b) Alternative.

3rd) Do you think the methodology used in this subject is appropriated for the alternative assessment system?

Answer the valuation questions, living a value from 0 (disagree or awful) to 5 (agree completely or very appropriated).

0      1      2      3      4      5

4th) Do you think this assessment system encourages your work?

0      1      2      3      4      5

5th) Do you think this assessment system stimulates teamwork?

0      1      2      3      4      5

6th) Do you think teamwork improves understanding of the subject contents?

0      1      2      3      4      5

7th) Work in groups is useful to discuss themes related to the subject.

0      1      2      3      4      5

8th) Do you think the teaching materials used by the lecturer have been original in comparison to other subjects?

Connection to some companies web pages (e.g: Industrias Antolín...)

0      1      2      3      4      5

Direct connection to videos in the Internet (e.g: Plasma TV manufacture...)

0      1      2      3      4      5

Articles related to the studied topics.

0      1      2      3      4      5

Exposition of summaries of the recommended bibliography.

0      1      2      3      4      5

9th) In your opinion, would you consider the use of 'Campus Virtual' an improvement for this subject?

0      1      2      3      4      5

10th) Indicate the number of hours that you dedicate to this subject, excluding hours of attendance.

- a) [0, 10) hours
- b) [10, 20) hours
- c) [20, 30) hours
- d) [30, 40) hours
- e) [40, 50] hours

Next the results obtained from the different questions will be analyzed.

1st) Most students study for personal and professional, interest, prevailing personal interest to professional one. (figure 1).

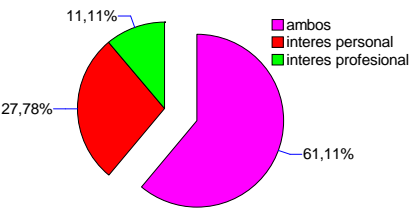


Figure 1.

2nd) The 100% of students prefer the alternative assessment method to the traditional one. (figure 2).

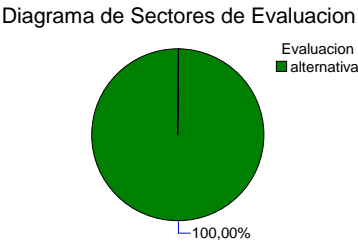


Figure 2.

3rd) They consider appropriate the methodology used in this subject. (figure 3).

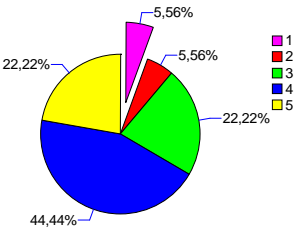


Figure 3.

4th) The subject evaluation is considered adequate to improve their work.(figure 4).

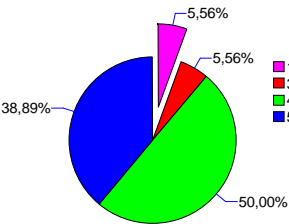


Figure 4.

5th) Students think that this assessment method stimulates teamwork. (figure 5).

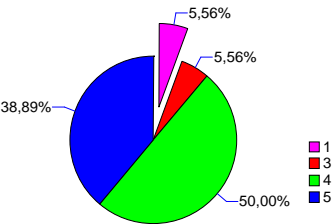


Figure 5.

6th) Students think that teamwork improves understanding of the subject contents. (figure 6).

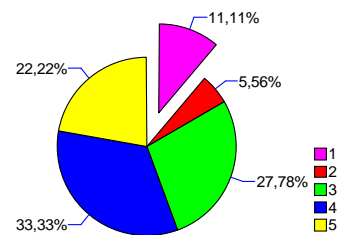


Figure 6.

7th) Students think teamwork is useful to discuss themes of the subject. (figure 7).

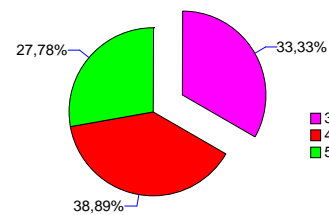


Figure 7.

8th) Students think that the materials used by the lecturer have been original in comparison to other subjects.

8.1st) Connection to some companies web pages (figure 8.1).

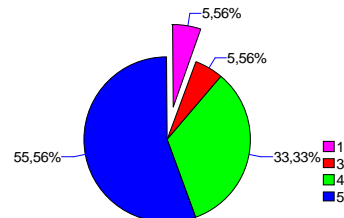


Figure 8.1.

8.2nd) Direct connection to videos in the Internet (figure 8.2).

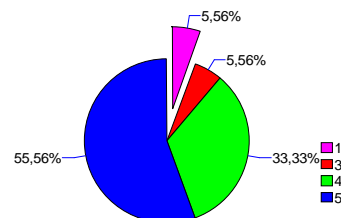


Figure 8.2.

8.3rd) Articles related to the studied topics.

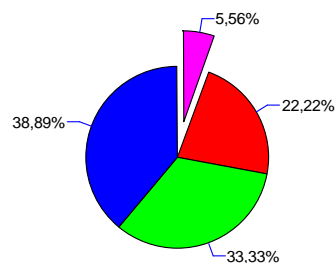


Figure 8.3.

8.4th) Expositions of summaries of the recommended bibliography.

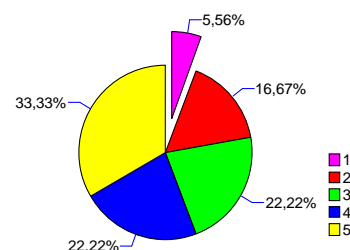


Figure 8.4.

9th) They think that the use of 'Campus Virtual' should be an improvement for this subject. (figure 9).

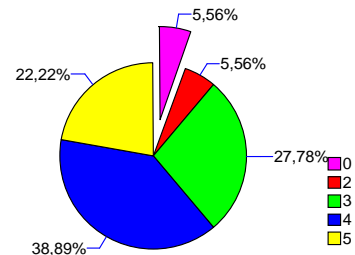


Figure 9.

10th) Students indicate the number of hours they dedicate to this subject (figure 10).

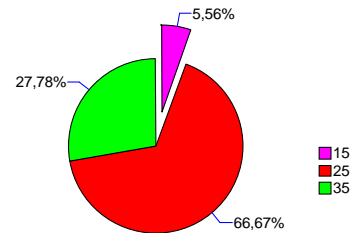


Figure 10.

Table 1 shows the activities made by every student, those who needed to make a final examination and those who made it to obtain a higher mark.

	Unit Summaries	A <sub>0</sub>	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>	A <sub>5</sub>	A <sub>6</sub>	A <sub>7</sub>	A <sub>8</sub>	A <sub>9</sub>	A <sub>10</sub>	Exposition	Classroom participation	Extra Activities	Logbook mark	Exam
St.1	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	6,475	No
St. 2	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No	5,15	No
St. 3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	6,3	No
St. 4	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	5,575	No
St. 5	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	5,65	No
St. 6	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	Yes	No	No	No	3,525	Yes
St. 7	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	5,675	No
St. 8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	7	No
St. 9	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	6,575	Yes *
St. 10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	5,55	No
St. 11	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	6,4	No
St. 12	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	No	No	4,05	Yes
St. 13	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	6,35	No
St. 14	Yes	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	2,1	Yes
St. 15	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	6,7	No
St. 16	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	5,1	No
St. 17	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	6,05	No
St. 18	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	5,8	Yes *
St. 19	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	No	5,85	No
St. 20	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	7	Yes *
St. 21	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	6,45	No

Table 1.

The following results are inferred from table 1: 18 from the 21 students who attended the ordinary summon examination passed with their logbook work, their participation in class, the expositions, etc. Three students of those 18, decided not to make the examination (it was not compulsory) to improve their qualifications (they are highlighted with the option 'Yes\*' in the examination column).

On the other hand, the three students who did not obtain the minimum qualification of 5 in their logbooks desisted from the alternative methodology at the beginning from the course, as they could not attend the lectures.

#### **4. CONCLUSIONS**

The following conclusions are drawn from the questionnaire:

Most students study for professional and personal reasons; all of them prefer the alternative method of assessment. The highest percentages obtained in the answers to the questions confirm that students consider the methodology appropriate. They think that the assessment method encourages their work so much individually as in groups, teamwork help them to internalise contents, and the materials used are quite original in relation to other subjects. They also suggest that the contents should be included in 'Campus Virtual' and finally, they affirm that they dedicate 35 hours to the subject every four months.

It may be withdrawn from the information given by students in the questionnaires that their degree of satisfaction is medium-high with respect to the innovation in the applied methodology in the subject.

From the experience carried out here, it can also be highlighted that the systematics used to evaluate students of Competitiveness and Innovation is adequate, as far as it is a small group, it is quite appropriate both from the point of view of academic results (table 1) as well as from students' perspective.

Some of the advantages of the methodology employed are: students' motivation for task making, implication of the students in developing their own 'manual' for the subject, their analytical attitude and ideas about the analysed cases, their initiative to propose cases, examples and a complementary bibliography for every unit. Besides in certain cases the logbooks have presented a high quality.

On the other hand it must be pointed out that an active participation of students in the classrooms is required, the development of lessons needs a thorough monitoring and demanded tasks need to be handed in punctually (usually asked for one class to the next) [6].

#### **5. ACKNOWLEDGMENTS**

We would like to thank the students from the academic year 2007/2008, for their collaboration on the survey and the development of the subject and the lecturer García García for her translation.

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